The Monsanto Equation:
Is Bayer's acquisition plan adding up?

Case Study

DEBORA MEINERS

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School of Business and Economics
Supervised by
Prof. José Neves de Almeida

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On a spring day on 23rd March 2016, Werner Baumann, who had just become CEO of Bayer AG 23 days earlier, sent out a letter comprising of what could become the largest acquisition ever done in the history of German companies. He had just released Bayer's all-cash offer to acquire Monsanto for a total price of $62bn to create a global leader in the agrochemical business. While Monsanto is by far the world's largest player in the seed business with 36% global market share in 2015 and particularly successful in the American market, Bayer is leading in several areas of the crop protection market with 18% market share and main focus in Europe. With the transaction completed, a mega player in the industry would emerge which could easily dwarf its remaining competitors.

About half a year and a lengthy bidding process later, the Monsanto Board of Directors finally agreed upon Bayer's all-cash offer of $128 per share which values the company at $66bn. What was striking, however, was that after the day of the announcement, Monsanto's share price dropped almost 5% to $101.08 instead of rising closer to the agreed upon takeover price as empirical evidence shows in takeover scenarios (Berk & DeMarzo, 2014).

General overview of the Agrochemical Industry

Generally, the agrochemical industry can be sub-divided into the two clusters crop protection (herbicides, fungicides, etc.) and seed business. While most companies engage in both categories, in terms of annual sales in 2015, Syngenta is with $10bn industry leading in the first and Monsanto with $10.2bn in the second category.

In 2015, global sales of crop chemicals, excluding seed businesses, summed up to $50bn with North and South America representing the largest market with a share of 45%, followed by Asia in the second place with 24%, and Europe in third with a 15% share (Exhibit 1). Global sales of seeds added another $29bn in sales to the agrochemical industry.

Over the last years, the most distinctive characteristic of the agrochemical industry has been the lack of growth opportunities and the thus resulting considerable degree of M&A activities.

Growth in this industry is mainly driven by an increasing demand for food due to rising population, changing diets and the scarcity of land available for cultivation, as well as an increasing awareness of the benefits of crop protection methods. Next to these macro drivers, there are several micro factors that influence the crop protection and seed business. These range from weather conditions such as droughts or floods to crop prices as well as available acreage which play a significant role in farmers' spending.

From 1961 to 2011, the number of people supported by one hectare land rose from 2.2 to 5. While in this period population grew by 130%, arable land only increased by 9% which highlights a clear demand for a more efficient cultivation system. The world population is expected to grow another 30% by 2050, indicating still a substantial growth however at a reduced pace (Bloomberg, 2016).

In terms of structure, the industry is led by a few big players of which, in 2015, the three largest companies with respect to sales were responsible for around 50% of total sales worldwide (Exhibit 2).

As the recent M&A wave implies, the agrochemical business is facing several challenges. Sales in the industry have begun slowing down already in the 1980s. Furthermore, in 2016, corn and soybean prices have declined for the third succeeding year as a result of healthy crops and strong harvests especially in the Americas (Phillips McDougall , 2015). Consequently, farmer's spending ability has declined and more and more customers moved to generic products. This, as well as heavy price pressure from competitors, had a depressing effect on glyphosate[1] prices, which is one of the main and most relevant agrochemical products, especially for Monsanto. Headwind is also expected from depreciating currencies in key markets such as Brazil and Argentina.

Furthermore, particularly in the North and South American market, another new challenge has

[1] Glyphosate is one of the most widely used broad-spectrum herbicides around the globe killing weeds and grasses that compete with crops.

emerged due to an increasing number of glyphosate-tolerant weeds and grasses as a result of the constant reapplication of one and the same product over the years (Phillips McDougall , 2015).

These factors and the lack of growth opportunities in the agrochemical industry have led to a significant amount of company consolidation in the previous decade. The most recent and prominent ones to mention have been the $130bn merger of DuPont and Dow Chemical, as respectively 4th and 6th largest agrochemical companies in the world in terms of sales, as well as the recent $43bn acquisition of industry leader Syngenta by ChemChina (Fontanella-Khan & Massoudi, 2016).

The Players

After the two M&A announcements of ChemChina and Syngenta as well as Dow and DuPont, the industry was left with three major players still to react: BASF, Bayer and Monsanto. With this shift in the competitive landscape of the industry, the remaining three companies found themselves in a difficult situation: The player who is making the last move and is likely to stand alone in the market will possibly lose its importance in the market due to comparative disadvantage in terms of market share and immense margin pressure due to the sheer size of the other competitors.

BASF

Headquartered in Ludwigshafen, the German company BASF is the largest chemical company in the world in terms of sales with around €70bn in 2015 (BASF, 2015). Its portfolio is diversified into the five sectors Oil & Gas, Chemicals, Performance Products, Functional Materials and Agricultural Solutions. Overall, in 2015, BASF's agricultural division makes up 9% of the company's portfolio in terms of sales, however 17% in terms of EBIT (BASF, 2015). In the global market for crop protection, the company ranks 3rd in terms of sales among its competitors.

BASF's agricultural business mainly focuses on crop protection and even though the company

operates research facilities for genetically modified products as well, there is currently no revenue generated from any kind of seed business. The company strongly focuses on fungicides and herbicides with 43% and 37% respectively in terms of overall crop protection sales. The remaining 20% are a result of insecticide operations and functional crop care (biological crop protection, seed treatment etc.) (BASF, 2015).

In the past two years, the company has been struggling as a result of depressed oil prices. In 2015, BASF's Chemical as well as Oil & Gas segment, which make up 49% of the total EBITDA, have recorded substantial losses and suffered from a 14% decrease in sales, while the Agrochemicals on the other hand increased by almost 7%. Expanding the agro sector would make strategic sense for BASF in order to balance the dependency on global oil prices. The company has allegedly been working on a takeover bid for Syngenta before the ChemChina acquisition announcement. Due to investor's expectations for the company to make a move, and as BASF also has a long history of close collaboration with Monsanto, it has been rumored that the company's board of directors evaluates a potential acquisition offer.

Bayer

The Leverkusen-based company with annual sales of €47bn in 2015 was initially focused on the chemicals sector, but is known today as major pharmaceutical company. In 2014, the company then decided to exclusively focus on its LifeScience business by spinning off its MaterialScience unit into a separate company which today operates and trades under the name Covestro (Phillips McDougall , 2015). By focusing their operations on LifeSciences, Bayer diversified its portfolio into the non-cyclical, high-risk pharmaceutical business as well as in the very cyclical, low-risk agricultural business.

Besides the crop protection business, Bayer's CropScience unit includes an Environmental Science unit as well as a seed and Genomics business. As of now, the latter only represents a small share of Bayer's CropScience activities. However, the company has taken several strategic moves in the last years intending to strengthen and realigning its seed business

(Phillips McDougall , 2015).

For Bayer, the Monsanto integration would not only mean that they could create a global leader in the agrochemical industry, but also narrow the gap between them and their major German rival BASF in terms of sales and profitability.

Monsanto

The St.-Louis based Monsanto is a multinational agrochemical company with main focus in the plant biotechnology sector and annual sales of $15bn in 2015. The company can be divided into the two sectors Seeds and Genomics as well as Agricultural Productivity (crop protection), which respectively make up 74% and 26% of total sales in 2015 (Exhibit 5.7) (Monsanto, 2015). The invention and the market development of the non-selective herbicide glyphosate, which is marketed under the name Roundup, resulted in major economic benefits for the company. In the 1980s, Monsanto started to invest into its seed business which led to an extensive product portfolio of glyphosate tolerant and/or insect resistant crops, which are marketed as Roundup Ready (Phillips McDougall , 2015).

In the past years, Monsanto's performance has been struggling due to a fourth straight annual decline in U.S. farmers' incomes, the immense depreciation of Brazilian real as well as an increase in competition (Exhibit 5.3 & 5.4) (Prella & Minder, 2016). In 2000, Monsanto lost its remaining outstanding glyphosate patents which in turn resulted in an increased amount of producers. This ultimately led to oversupply in the market and margin decline due to the introduction of generic products.

In their Seeds and Genomics business, however, Monsanto is still leading in the market and benefits from a long history of successful R&D. An example for this is the trait DroughtGuard^{TM} which is the world's only drought-tolerant corn seed (Monsanto , 2017). This is a particular advantage in terms of sales when weather phenomena such as La Niña which are expected to bring droughts to South America in 2017 (Sullivan, 2016).

The company expects a growth in its soy bean business of 20% in the upcoming year as a result

of its newly launched Intacta RR2Pro and Roundup Ready 2 Xtend soybeans which both experienced rapid growth in FY 2016 (Monsanto, 2016). Overall revenue however still faces some headwind as a result of depressed farmers spending as well as continuing depreciating currencies in key markets. According to the U.S. Department of Agriculture, crop prices are expected to continue to decline until the end of 2016, then slowly picking up again in 2017 until 2020 (Exhibit 5.4) (USDA, 2016).

Deal Timeline

After rumors emerged on 19th May 2016 that BASF as well as Bayer were interested in acquiring Monsanto, the market reacted by a substantial decline of 5% of the Bayer share, an almost 11% increase in the Monsanto share while barely showing any movement of the BASF share, indicating that a takeover scenario by Bayer seems most probable (Exhibit 7.2) .

May 16 Bayer offers to acquire Monsanto to create a global leader in agrochemicals for $122 per share all-cash offer, valuing Monsanto at $63bn on 23rd May. Monsanto announces openness to deal however rejects offer as inadequate. Additional clarification on financing and regulatory matters are required.

Jul 16 Bayer increased all-cash offer to $125 per share, representing a 40% premium from Monsanto's closing price before the first rumors emerged.

Jul 16 Monsanto repeatedly rejects offer from Bayer as financially inadequate.

Aug 16 Bayer reviews Monsanto's financial accounts to justify a revised offer with a raised bid. Option for hostile takeover has not been ruled out.

Sep 16 Bayer revises offer to $127.50 per Monsanto share. Bid is still below the hurdle of $149 a share needed to match the EV/EBITDA multiple that ChemChina is paying for Syngenta.

Sep 16 Bayer revises offer to $128 per Monsanto share valuing the company at $66bn including net debt. This represents a 44% premium of Monsanto's share price one day before the offer announcement and values the company's equity at $57bn. Monsanto's board of directors accepts the offer. Bayer expects around $1.5bn annual synergies after year three.

Benefits of the Deal

Bayer CEO Werner Baumann (2016) believes in five major benefits of the deal.

First of all, the assimilation of Monsanto would balance Bayer's overall product portfolio from a 70/30 healthcare to crop science ratio to approximately 50/50.

Second, the agrochemical sector offers Bayer an attractive low risk industry that is benefitting from inevitable macro trends such as the population growth and consequently the immense increase in the number of people that need to be supplied per hectare of land.

Third, in terms of global sales among industry leaders the combined companies would by far be leading with projected 30% higher sales than any of its competitors.

Fourth, Bayer's and Monsanto's product portfolios are almost ideally for a merger scenario. Instead of creating a monopoly in a certain sector, in which case the transaction would most certainly be blocked by anti-trust agencies, the two companies align with only very little overlap. The few existing overlays, especially in the herbicide sector, could be divested in order for the deal to go through. With this acquisition, Bayer expands and diversifies its agribusiness in all areas of the crop chemicals market, including crop protection, seed business as well as digital farming.

Last but not least, the timing of the deal plays an important role. With the recent rapid market consolidation in the agrochemical world, Bayer has been under pressure to make a move in order to stay competitive in the market. As Bayer has obliterated all its chemical operations except for its LifeScience division, the company is much more dependent on a profitable agribusiness than its more diversified competitors.

Challenges of the Deal

Antitrust regulations

All mergers and acquisitions have to be approved by regulators in order to prevent the creation of monopolies that could threat the competition in the market. Theoretically, takeovers need to be approved by more than 80 jurisdictions worldwide (DeMarzo & Berk, 2014). Practically,

however, the most important jurisdictions are Europe and the United Sates. Owing to the vast impact on the countries and Monsanto's market share, also the authorities in Brazil and China are not to be neglected in this deal (Lynch & Cazan, 2016). Before the actual acquisition can occur, Bayer needs to have government approval by these authorities (DeMarzo & Berk, 2014). Due to the substantial size and market share of the two companies, the regulatory approval of the deal sows seeds of doubt among investors. As a consequence, instead of rising, Monsanto's share price fell by almost 6% after the acquisition agreement in September 2016.

In 2007, Monsanto intended to acquire the large cotton seed producer Delta & Pine Land Company. The acquisition has been refused by US antitrust authorities until Monsanto divested the Stoneville Pedigreed Seed Company, which is a similar enterprise. The buying party at the time happened to be no other than Bayer. Nine years later investors wonder whether the Monsanto-Stoneville reunion could pose a potential threat on the completion of the deal (Lynch & Cazan, 2016).

Ever since however, the agrochemical industry underwent several changes of which most notably has been the consolidation of some of the largest players, reducing the amount of six major players into three or four.

While Bayer is big in crop protection and the European market, Monsanto focuses on seeds and related biotechnology mainly in the American market (**Fehler! Verweisquelle konnte nicht gefunden werden.**). For this reason, Bayer executives argue that overlaps between the two companies are minimal and that concerns were resolvable with divestures (Exhibit 4). Furthermore, Bayer promised to pay a break-up fee of $2bn in case the deal gets rejected due to anti-trust reasons (Bayer, 2016).

Monsanto's image

For more than two decades, Monsanto has been the number 1 producer of seeds and biotechnology traits that help farmers control unforeseen environmental factors that could damage crop yields. The company's heavy engagement in genetically modified seeds and crop

protection chemicals made the company the main target for activists who claim Monsanto's products pose a serious threat to the human health as well as on the natural evolution process of plants. On top of that, Monsanto has been blamed amongst others for legal tactics used to file for patents, suicides of farmers as well as for the decline of certain species such as the monarch butterfly (Skerritt, 2016).

Even though the company rejected the criticism and none of the studies could prove any health risk of genetically engineered crops as well as Monsanto's glyphosate, the company's reputation maintained its bad image (Serafino & Kirchfeld, 2016). In 2015, Monsanto got ranked by the Harris Poll's as the 4th most hated company in the U.S., ranked worse than BP (No. 11) and Halliburton (No. 5) who have been involved in the Deepwater Horizon Oil Spill (Otani, 2015). Bayer's current CEO, Werner Baumann, is confident that this bad image vanishes after the merger has been completed. In an interview (2016) he said that "Bayer's name and Bayer's reputation stands for science, innovation and an utmost level of responsibility for societal needs, and that is what we are going to leverage on, also for the combined company going forward." The idea is, as Bayer has done in previous mergers, to erase Monsanto's brand name with the completion of the deal (Baumann, 2016). Besides, other companies in the seed business such as Bayer itself do not seem to be in the crossfire of negative publicity. Bayer actually seems to be quite the contrary to Monsanto as it enjoys a great reputation among the general public as it has just been voted as one of America's most reputable companies (Bayer, 2015).

Financing

To complete the deal as soon as possible, Bayer secured a bridge financing for $57bn initially committed by five major banks, before being distributed to a larger syndicate. For the permanent financing, Bayer announced to employ a combination of debt and equity. The planned equity component amounts to $19bn which will be raised with the help of $4bn mandatory convertible bonds (issued on 11/09/16) as well as through a rights issue. With this planned equity issuance and current EUR/USD exchange rate, Bayer stays within the previously

granted authorized capital (Exhibit 9) (*Authorized Capital*, §§ 202-206 AktG). This was a strategic move by Bayer in order to avoid a shareholder's vote. This would, according to the German law, require a majority of 75% of the shareholders voting in favor of the transaction (Bayer , 2015). Due to Monsanto's image and a large amount of activist investors, this vote could have caused a serious threat for the transaction.

In addition, the low interest rate environment and Bayer's creditworthiness (long-term rating: Moody's A3, S&P A-) are also beneficial and enable a large amount of debt financing.

On the contrary, Bayer's current market cap sums up to $81bn and issuing $38bn of debt plus adding Monsanto's indebtedness will change the financial risk profile of the company. Moreover, also Monsanto's balance sheet records a high amount of net debt due to a recent $10bn share repurchasing program. All three major rating agencies (Moody's, S&P, Fitch) have announced to likely downgrade Bayer one or two notches in case the transaction goes through.

Conclusion

Looking at the market reaction after the announcement of the deal and the lack of trust of investors that the deal will actually go through, Baumann was wondering whether this has actually been the right strategic move to make. He was thinking to himself whether the bidding process and the ultimate price for Monsanto were too aggressive due to the fear that BASF could have made the move. Will Bayer even be able to raise enough money to finance the transaction? How can we convince our shareholders to provide us with the necessary increase in equity and how would this affect our stock price?

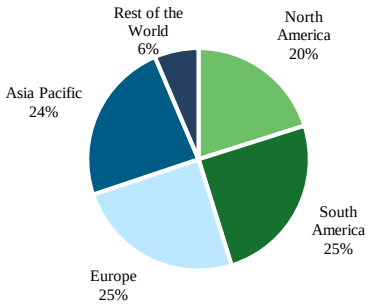
More profoundly, was this the right decision to make given the current situation of the market or would there have been alternatives that we didn't consider? How will our competition react? Was the timing right to enter into this agreement? With all the other M&A activities and the low interest rate environment, acquisition premiums may be quite considerable. What other risks have not been considered yet? All these challenges will impose a substantial strain on Bayer's

business. On the other hand, if we had waited, even fewer attractive acquisition targets would have been available for Bayer.

Appendices

Exhibit 1

Agrochemical Market Size by Region



Leading Companies by Region *(In terms of sales)*

	Europe	North America	South America	Asia Pacific
1	Syngenta	Monsanto	Syngenta	Syngenta
2	Bayer	Syngenta	Bayer	Bayer
3	BASF	Bayer	Monsanto	Monsanto
4	Monsanto	BASF	BASF	BASF

Exhibit 2

Leading 6 Companies: Sales Development
Crop Protection vs Seed Business

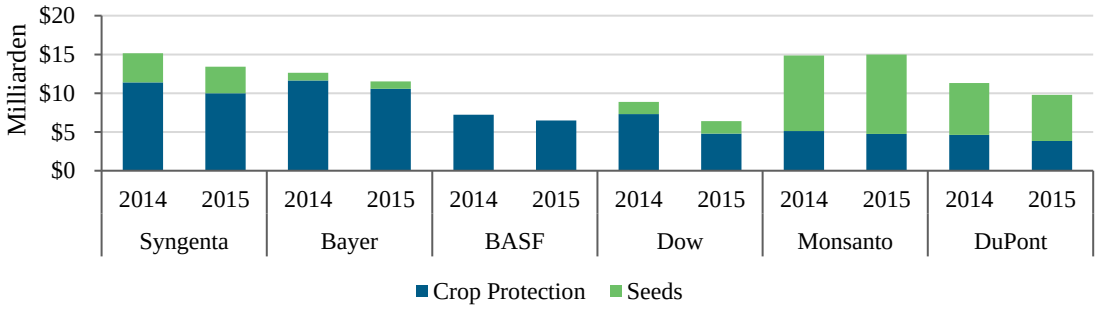
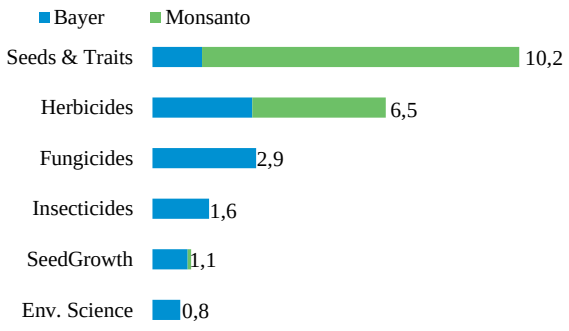
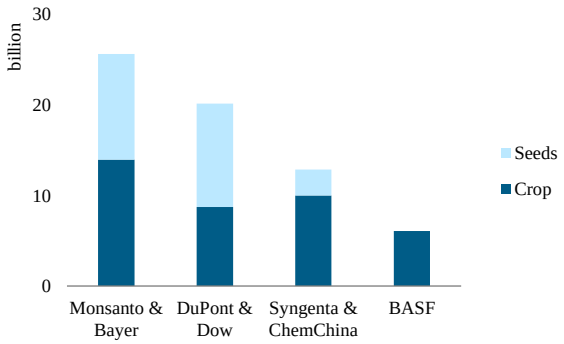


Exhibit 3

2015 Pro Forma Sales (€bn)





Source: Bayer Presentation, May 23, 2016

EXHIBIT 4.1 **Balance Sheet Monsanto & Bayer**

€/$ million

	Bayer (EUR)			Monsanto (USD)			
	2013	2014	2015	2013	2014	2015	2016
	12/31/2013	12/31/2014	12/31/2015	08/31/2013	08/31/2014	08/31/2015	08/31/2016
Assets							
Cash and cash equivalents	1,662	1,853	1,859	3,922	2,407	3,748	1,736
Trade and other receivables	7,569	9,097	9,933	1,715	2,014	1,636	1,926
Inventories	7,129	8,478	8,550	2,947	3,597	3,496	3,241
Other short-term assets	2,094	2,407	3,016	1,469	1,558	1,668	1,221
Derivative & hedging assets	574	392	463	24	99	77	33
Total Current Assets	19,028	22,227	23,821	10,077	9,675	10,625	8,157
Property and equipment	28,455	31,319	33,540	9,491	10,357	10,428	11,116
Accumulated depreciation	(18,440)	(19,891)	(21,165)	(4,837)	(5,275)	(5,455)	(5,885)
Long-term receivables	-	-	-	237	92	42	-
Goodwill	9,862	15,347	16,096	3,520	4,319	4,061	4,020
Other intangible assets	8,914	15,653	15,178	1,226	1,554	1,332	1,125
Deferred tax assets	1,596	3,802	4,679	454	450	277	613
Derivative & hedging assets	191	92	63	-	31	8	4
Investments in affiliates	203	223	246	-	-	-	-
Misc long-term assets	1,508	1,462	1,459	496	715	602	586
Total Assets	51,317	70,234	73,917	20,664	21,918	21,920	19,736
Liabilities and equity							
Accounts payable	4,574	5,808	6,868	995	1,111	836	1,006
Short-term debt	3,324	3,080	2,823	51	233	615	1,587
Deferred revenue	-	-	-	517	438	370	568
Derivatives & hedging	117	296	598	93	23	61	69
Income Taxes Accrued/Payable	-	-	-	91	99	234	41
Accrued marketing programs	-	-	-	1,078	1,394	1,492	1,736
Dividends Accrued/Payable	-	-	-	228	239	254	237
Grower Production Accruals	-	-	-	60	54	39	45
Accrued Compensation & benefits	-	-	-	492	500	304	239
Customer Payable	-	-	-	12	82	72	104
Restructuring Reserves	-	-	-	-	-	170	246
Misc short-term liabilities	6,008	6,319	6,691	719	939	730	851
Total Current Liabilities	14,023	15,503	16,980	4,336	5,112	5,177	6,729
Long-term debt	5,396	18,136	16,346	2,061	7,465	8,429	7,453
Pension liabilities	7,368	12,236	10,873	357	345	336	371
Deferred revenue	-	-	-	138	47	47	35
Deferred tax liabilities	1,193	689	826	469	509	340	68
Derivatives & hedging	194	348	167	-	-	-	-
Misc. LT Liabilities	2,339	3,104	3,280	575	526	586	535
Common stock	2,117	2,117	2,117	6	6	6	6
Paid-in capital	6,167	6,167	6,167	10,783	10,003	11,464	11,626
Treasury stock	-	-	-	(4,140)	(10,032)	(12,053)	(15,053)
Retained earnings	14,817	12,974	16,581	7,188	9,012	10,374	10,763
Other equity	(2,383)	(1,152)	(600)	(1,278)	(1,114)	(2,801)	(2,808)
Minority/Noncontrolling interest	86	112	1,180	169	39	15	11
Total liabilities & equity	51,317	70,234	73,917	20,664	21,918	21,920	19,736

(Source: Bayer & Monsanto Annual Report, 2013-2016)

EXHIBIT 4.2 **Income Statement Monsanto & Bayer**

€/$ million

	Bayer (EUR)			Monsanto (USD)			
	2013	**2014**	**2015**	**2013**	**2014[3]**	**2015[2]**	**2016[1]**
	12/31/2013	**12/31/2014**	**12/31/2015**	**08/31/2013**	**08/31/2014**	**08/31/2015**	**08/31/2016**
Revenue	40,817	41,754	46,936	14,861	15,855	15,001	13,502
Cost of goods sold	(19,516)	(19,909)	(21,158)	(7,208)	(7,281)	(6,819)	(6,485)
Depreciation & amortization	*2,896*	*2,920*	*3,333*	*615*	*691*	*716*	*727*
Selling, general & administrative	(12,135)	(12,335)	(14,402)	(2,550)	(2,751)	(2,686)	(2,833)
Research & development	(3,406)	(3,537)	(4,281)	(1,533)	(1,725)	(1,580)	(1,512)
EBIT	5,760	5,973	7,095	3,570	4,098	3,916	2,672
Interest expense	(602)	(618)	(752)	(172)	(248)	(433)	(436)
Interest Income	257	283	297	92	102	105	74
Other non-operating income (loss)	(334)	(646)	(550)	(61)	(101)	(34)	(22)
Abnormal gains (losses)	(874)	(578)	(845)	-	(24)	(393)	(297)
Earnings before taxes	4,207	4,414	5,245	3,429	3,827	3,161	1,991
Income tax	(1,644)	(1,305)	(2,258)	(789)	(1,123)	(1,152)	(667)
Deferred income tax	623	234	1,031	(126)	45	288	(28)
Earnings from continuing operations	3,186	3,343	4,018	2,514	2,749	2,297	1,296
Discontinued operations	-	100	80	11	13	28	17
Minority interest	3	(17)	12	(43)	(22)	(11)	23
Net Income	3,189	3,426	4,110	2,482	2,740	2,314	1,336
Share price			100.00 €				$ 102.42
Shares outstanding			826,947,808				438,178,000

(1) In 2016, the company recorded $67 million of cost of goods sold expenses related to the 2015 Restructuring Plan, $297 million of restructuring charges and $270 million of selling, general and administrative expenses related to environmental and litigation settlements and a SEC settlement.
(2) In 2015, Monsanto recorded $100.5 million of cost of goods sold expenses related to restructuring, $167.3 million of selling, general and administrative expenses related to environmental and litigation settlements and a potential SEC settlement, and $392.7 million of restructuring expense. The company also recorded $274 million of net sales as a result of the sale of a perpetual license to intellectual property.
(3) In 2014, Monsanto recorded $31.8 million of selling, general and administrative expenses related to legacy environmental settlements.

(Source: Bayer & Monsanto Annual Report, 2013-2016)

EXHIBIT 4.3 **Tax Reconciliation Monsanto Company**

$ million

	2016	**2015**	**2014**	**2013**
U.S. Federal Statutory Rate	697	1,106	1,339	1,200
U.S. Domestic Manufacturing Deduction	(64)	(87)	(75)	(68)
U.S. R&D Tax Credit	(34)	(30)	(12)	(43)
U.S. State Income Taxes	28	39	45	43
Lower Taxes on Foreign Operations	(243)	(209)	(230)	(78)
Valuations Allowances	308	13	12	-
Adjustments for Unrecognized Tax Benefits	(6)	(4)	(8)	(110)
Other	9	36	7	(29)
Income Tax Provision	695	864	1,078	915

(Source: Monsanto Annual Report, 2016-2013)

EXHIBIT 4.4 **Deferred Income Tax Balance Monsanto Company**

$ million

	2016	2015	2014	2013
Net Operating Loss and Other Carryforwards	438	323	443	455
Employee Fringe Benefits	331	305	259	335
Restructuring and Impairment Reserves	155	242	135	137
Inventories	91	173	106	130
Royalties	189	154	129	99
Allowance for Doubtful Accounts	77	72	70	95
Environmental and Litigation Reserves	70	69	69	71
Intangibles	-	-	74	46
Other	407	307	350	239
Valuation Allowance	(346)	(68)	(63)	(47)
Total Deferred Tax Assets	1,412	1,577	1,572	1,560
Property, Plant and Equipment	533	539	$ 585	$ 571
Intangibles	334	361	400	403
Other	-	-	81	60
Total Deferred Tax Liabilities	867	900	1,066	1,034
Net Deferred Tax Assets	545	677	506	526

(Source: Monsanto Annual Report, 2016-2013)

EXHIBIT 4.5 **Intangible Assets Monsanto Company**

$ million

	2016			2015			2014		
	Carrying Amount	Accumulated Amortization	Net	Carrying Amount	Accumulated Amortization	Net	Carrying Amount	Accumulated Amortization	Net
Acquired Germplams	1,070	(778)	292	1,074	(750)	324	1,116	(751)	365
Acquired Intellectual Property	1,042	(593)	449	1,168	(598)	570	1,160	(507)	653
Trademarks	334	(152)	182	353	(152)	201	366	(142)	224
Customer Relationships	301	(223)	78	318	(212)	106	338	(204)	134
Other	65	(33)	32	176	(146)	30	181	(106)	75
Total Other Intangible Assets, Finite Lives	2,812	(1,779)	1,033	3,089	(1,858)	1,231	3,161	(1,710)	1,451
In Process R&D, Indefinite Lives	92	-	92	101	-	101	103	-	103
Total Other Intangible Assets	2,904	(1,779)	1,125	3,190	(1,858)	1,332	3,264	(1,710)	1,554

(Source: Monsanto Annual Report, 2016-2013)

EXHIBIT 4.6 **Others Monsanto Company**

$ million

	2017	2016	2015	2014	2013
Rental expenses	249	256	273	272	259
Amortization		116	143	136	111
Divident payments		964	938	904	802
Customer Financing Program		644	1,050	574	437

Long-term debt	**Yield**
MON 3.95 04/15/45 Corp	4.750%
Exchange rate	
EUR/USD	1.05

(Source: Monsanto Annual Report, 2016-2013; Bloomberg Terminal)

EXHIBIT 4.6 **Monsanto Sales by Geography**

(in USD millions)	**2013**	**2014**	**2015**	**2016**
Revenue	**14,861**	**15,855**	**15,001**	**13,502**
United States	8,044	8,625	8,612	8,008
Latin America	3,354	3,565	3,268	2,856
Brazil	*1,547*	*1,778*	*1,725*	*1,437*
Argentina	*1,121*	*1,092*	*871*	*856*
Mexico	*466*	*503*	*537*	*436*
Other	*220*	*192*	*135*	*127*
Europe-South Africa	2,042	2,192	1,834	1,536
Canada	615	636	601	619
Asia-Pacific	806	837	686	483

(Source: Monsanto Annual Report, 2016-2013)

EXHIBIT 4.7 **Monsanto Segments**

(in USD millions)	**2013**	**2014**	**2015**	**2016**
Seeds and Genomics	10,340	10,740	10,243	9,988
Corn Seed and Traits	*6,596*	*6,401*	*5,953*	*5,825*
Soybean Seed and Traits	*1,653*	*2,102*	*2,276*	*2,162*
Vegetable and Fruit Seed	*821*	*867*	*816*	*801*
All Other Crops Seeds and Traits	*575*	*705*	*675*	*760*
Cotton Seed and Traits	*695*	*665*	*523*	*440*
Agricultural Productivity	4,521	5,115	4,758	3,514
Total Sales	14,861	15,855	15,001	13,502

(Source: Monsanto Annual Report, 2016-2013)

EXHIBIT 5.1 **US Treasury Yields**

Maturity (Years)	Yield
1	0,78
2	1,12
3	1,38
5	1,81
10	2,33
30	2,98

EXHIBIT 5.2 **Expected Inflation**

Country	**Monsanto Market Share**	**Exp. Inflation**
North America	59%	2,1%
South America	21%	5,7%
Europe	11%	1,5%
Canada	5%	2,0%
Asia	4%	2,2%

(Source: Bloomberg Terminal, as of 11/21/2016)

EXHIBIT 5.3 **Full year forecast (vs. USD)**

Full year forecast (vs. USD)

	2017	**2018**	**2019**	**2020**
BRL	0,30	0,29	0,28	0,28
EUR	1,09	1,15	1,17	1,19
ARS	0,06	0,05	0,05	0,05

(source: Bloomberg, as of 11/21/2016)

EXHIBIT 5.4 **U.S Agriculture Supply/Demand Forecast**

(source: Bloomberg, Doane, USDA)	2020	2019	2018	2017	2016	2015	2014	2013
U.S. Corn (Mn bushels)								
Acreage Planted (Mn acres)	90	90	90	91	94	88	91	95
Yield (bushels/acre)	177	175	173	171	172	168	171	158
Total Supply	16,565	16,445	16,400	16,466	16,665	15,397	15,479	14,686
Total Use	14,495	14,585	14,405	14,265	14,405	13,663	13,748	13,455
Avg. Crop Price ($/bushel)	**3.50**	**3.50**	**3.45**	**3.30**	**3.25**	**3.61**	**4**	**4**
U.S. Soybean (Mn bushels)								
Acreage Planted (Mn acres)		85	85	84	84	83	83	77
Yield (bushels/acre)		48	47	47	49	48	48	44
Total Supply		4,360	4,315	4,275	4,365	4,145	4,052	3,570
Total Use		4,060	4,005	3,950	4,020	3,890	3,862	3,478
Avg. Crop Price ($/bushel)		**10**	**10**	**9**	**9**	**9**	**10**	**13**
U.S. Wheat (Mn bushels)								
Acreage Planted (Mn acres)	51	51	50	49	50	55	57	56
Yield (bushels/acre)	48	48	47	47	53	44	44	47
Total Supply	2,890	2,955	3,080	3,220	3,400	2,927	2,767	3,026
Total Use	2,250	2,250	2,270	2,245	2,226	1,952	2,015	2,436
Avg. U.S. Crop Price ($/bushel)		**6**	**6**	**6**	**6**	**5**	**6**	**7**
U.S. Cotton (1000 480 lb. bales)								
Acreage Planted (Mn acres)	10,750,000	10,750,000	10,500,000	10,500,000	10,145,000	8,581,000	11,037,400	10,407,000
Yield (lbs/acre)	830	825	820	815	797	766	838	821
Total Supply	19,605	19,608	19,385	19,591	19,844	16,568	18,680	16,719
Total Use	16,150	15,900	15,650	15,600	15,500	12,600	14,830	14,080
Avg. Crop Price (cents/lb.)	**68**	**67**	**66**	**65**	**64**	**58**	**61**	**78**

EXHIBIT 6 **Bayer Management Report & Annexes**

19. Takeover-Relevant Information

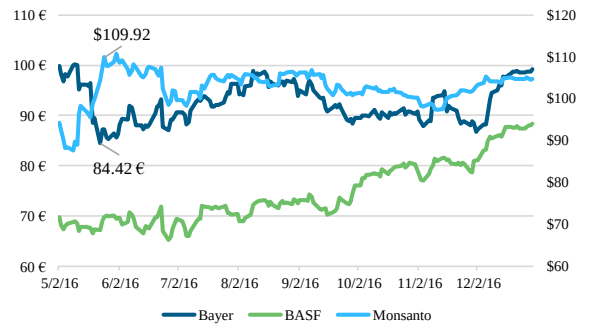
Explanatory report pursuant to Sections 289, Paragraph 4 and 315, Paragraph 4 of the German Commercial Code (HGB)
The capital stock of Bayer AG amounted as of December 31, 2015 to €2,117 million, divided into 826,947,808 no-par registered shares. The capital stock and the number of shares were thus unchanged from the end of the previous year. Each share confers one voting right. [...]

Provisions of the Articles of Incorporation concerning Authorized Capital I and Authorized Capital II are entered in the commercial register of Bayer AG. With the approval of the Supervisory Board and until April 28, 2019, the Board of Management may use the Authorized Capital I to increase the capital stock by up to a total of €530 million. New shares may be issued against cash contributions and / or contributions in kind, but capital increases against contributions in kind may not exceed a total of €423 million. If the Authorized Capital I is used to issue shares in return for cash contributions, stockholders must normally be granted subscription rights. [...]

(Source: Bayer Annual Report, 2015)

EXHIBIT 7.1 **EUR/USD Exchange Rates**

EXHIBIT 7.2 **Share Price Developments**



(Source: Bloomberg Terminal, 01/01/2017)

Teaching Note

Case objectives

The main objective of the case is to do an M&A valuation of the Bayer Monsanto deal. This includes a company valuation of Monsanto using the DCF method in order to decide whether the premium Bayer paid to the current share price can be justified. Further tasks include answering questions with strategic relevance as well as other M&A-related questions including the financing of the transaction. This case is applicable for any Corporate Finance, M&A or Valuation class.

Relevant Literature

Koller, T., Goedhart, M., & Wessels, D. (2011). *Valuation - Measuring and Managing the Value of Companies.* Hoboken: John Wiley & Sons, Inc.

Monsanto (2015). *Annual Report.* St. Louis: Monsanto Company.

Bayer (2015). *Annual Report*. Leverkusen: Bayer AG.

DeMarzo, P., & Berk, J. (2014). *Corporate Finance.* Boston: Pearson.

Marks, Kenneth et al. (2005). *The Handbook of Financing Growth – Strategies and Capital Structure*. Hoboken: John Wiley & Sons.

Diverse FT, Bloomberg News, WSL articles

Suggested Questions

1. Valuing Monsanto Company using the DCF method. Include mentioned synergies.
2. Financing:
    a. Risks of financing the deal and evaluation of Bayer proposal
    b. How to successfully issue the planned amount of equity? What is the max discount for the new shares to avoid a shareholder vote?
    c. How will the share price be affected?
3. Strategy:
    a. Was the decision to acquire Monsanto right? Would there be alternatives?
    b. How will the competition most likely react?
    c. Are there other factors that have not yet been considered?

Suggested Solution

Q1. Valuing Monsanto Company using the DCF method

Reorganizing Financial Statements & NOPLAT Calculation

The first step for the company valuation using the discounted cash flow (DCF) method is to reorganize the financial statements and separate operating from non-operating assets in order to calculate the free cash flows (FCF). As per definition (Koller, Goedhart, & Wessels, 2011), FCFs are independent from non-operating assets as well as from financing.

$$FCF = NOPLAT + Noncash\ Operating\ Expense - Investments\ in\ Invested\ Capital$$

To calculate the net operating profits less adjusted taxes (NOPLAT), the income statement needs to be adjusted for operating costs and operating taxes. This requires a thorough analysis of the company's financial statements as well as the footnotes included. In 2016, the company reported $67 million restructuring expenses as part of COGS. In 2015, Monsanto reported $101 million of restructuring expenses as part of COGS as well as a $274 million sale of a perpetual license which has been recorded as part of revenue. Furthermore, Monsanto's selling, general & administrative expenses (SG&A) need to be adjusted for litigation and environmental settlement outlays which are $32, $167 and $270 million respectively in 2014, 2015 and 2016 as well as for $392.2 and $297 million restructuring expense in 2015 and 2016 (Exhibit 4.2).

Subtracting the adjusted operating expenses from the net sales leads to the company's EBIT. For the FCF calculation, it is recommended to use EBITA because the accounting for intangibles differs from physical assets. The amortization values from the cash flow statement are shown in Exhibit 4.6. Intangibles are expensed and not capitalized, and thus using EBITA avoids double-counting amortization expenses (Koller, Goedhart, & Wessels, 2011).

NOPLAT is calculated by subtracting Monsanto's operating taxes as well as the change in deferred taxes from its EBITA (refer to chapter "Tax adjustments" for operating tax calculation).

(Dollars in millions)	**2013**	**2014**	**2015**	**2016**
Net Sales	14,861	15,855	15,001	13,502
Cost of goods sold	7,208	7,281	6,819	6,485
Thereof perpetual license sale			*(274)*	
Thereof expenses related to restructuring	-	-	*(101)*	*(67)*
Gross Profit	7,653	8,574	7,808	6,950
Operating Expenses:				
Selling, general & administrative expenses	2,550	2,774	2,686	2,833
Thereof expenses for litigation & environmental settlements	-	*(32)*	*(167)*	*(270)*
Thereof expenses related to restructuring			*(392)*	*(297)*
Research & development expenses	1,533	1,725	1,580	1,512
Total Operating Expenses	4,083	4,467	3,707	3,778
EBIT	**3,570**	**4,107**	**4,101**	**3,172**
Amortization	111	136	143	116
EBITA	3,681	4,243	4,244	3,288
Operating Taxes	1,035	1,221	1,220	1,158
+/- Change in Deferred Taxes	27	38	(113)	76
NOPLAT	**$ 2,673**	**$ 3,059**	**$ 2,911**	**$ 2,206**

Table 1: Net Operating Profit less Adjusted Taxes (NOPLAT) Calculation for Monsanto

Tax adjustments

Operating Taxes

In order to calculate the operating taxes, we have to find the tax reconciliation table in the financial report, convert reported values into percentages and eliminate non-operating and one-time taxes (Exhibit 4.3). The adjustment for operating taxes requires judgement in many cases. As a proxy for the marginal tax rate we can use the statutory rate plus the state tax (Koller, Goedhart, & Wessels, 2011) which sums up to 36.4% for Monsanto in 2016 (taken from the tax reconciliation table of the annual report, Exhibit 4.3). As amortization is usually nondeductible from taxes, we calculate the operating taxes as a function of Monsanto's adjusted EBITA which results into marginal taxes of $1.197 million in 2016. For the operating taxes, we have to take into account tax benefits that the company is exposed to such as tax credit for R&D expenditures or lower foreign rates as a result of business operations in other countries with lower tax rates than the U.S. For the Monsanto analysis, all the reported taxes can be considered operating except for those reported as "Other, net". There is no further description of this type of taxes in the financial report, however the values seesaw significantly which is why it is excluded from the analysis. Adjusting the marginal tax rate for the tax benefits leads to an operating tax rate of 35% in 2016 as can be seen in Table 2.

(Dollars in millions)	**2013**	**2014**	**2015**	**2016**
Operating Taxes and Operating Cash Taxes				
Marginal Tax Rate	36.2%	36.2%	36.2%	36.4%
x Adjusted EBITA	3,681	4,243	4,244	3,288
= Marginal taxes on EBITA	**1,334**	**1,534**	**1,537**	**1,197**
Other Operating Taxes:	**$ (299)**	**$ (313)**	**$ (317)**	**$ (39)**
Lower Foreign rates	$ (78)	$ (230)	$ (209)	$ (243)
U.S. Domestic Manufacturing Deduction	$ (68)	$ (75)	$ (87)	$ (64)
U.S. R&D Tax Credit	$ (43)	$ (12)	$ (30)	$ (34)
Valuation Allowances	$ -	$ 12	$ 13	$ 308
Adjustment for Unrecognized Tax Benefits	$ (110)	$ (8)	$ (4)	$ (6)
Operating Taxes	**$ 1,035**	**$ 1,221**	**$ 1,220**	**$ 1,158**
Operating tax rate	**28%**	**29%**	**29%**	**35%**

Table 2: Operating Taxes for Monsanto

Deferred Taxes

For a more accurate valuation, it makes sense to use the operating cash taxes that were actually paid instead of simply using the reported accrual-based taxes. This deviation exists mainly due to accounting differences in taxation and reporting. For example, the government allows an accelerated depreciation to reduce tax burden in the beginning of an asset life while the figures in the financial statement are usually reported using straight-line depreciation, thus overstating actual taxes (Koller, Goedhart, & Wessels, 2011).

The easiest way to calculate the cash taxes is to subtract the delta in net operating deferred tax liabilities (DTLs). The deferred income tax balances can be found in the same footnote as the tax reconciliation table (Exhibit 4.4). Monsanto has one operating-related DTA (deferred tax assets) and one DTL. The first one is reported as property, plant and equipment (PP&E) and refers to accelerated depreciation (a DTL). The second one refers to inventories (a DTA) as a result of differences in inventory valuation between tax and financial accounting. Subtracting the DTA from the DTL yields net operating deferred-tax liabilities of $442 million in 2016. The remaining items in the deferred income tax table are related to non-operating DTAs and DTLs as highlighted in Table 3.

Deferred income tax balances are related to	**2013**	**2014**	**2015**	**2016**
Tax loss carry-forwards				
Net operating losses	$ 455	$ 443	$ 323	$ 438
Valuation allowance	(47)	(63)	(68)	(346)
Tax loss carry-forwards	408	380	255	92
			600	
Operating deferred taxes				
Accelerated depreciation	571	585	539	533
Accelerated inventory deduction	130	106	173	91
Net operating deferred-tax liabilities	$ 441	$ 479	$ 366	$ 442
Nonoperating deferred taxes				
Goodwill and other intangibles	(357)	(326)	(361)	(334)
Other deferred-tax liabilities	60	81	-	-
Other deferred-tax assets	$ 976	$ 1,012	$ 1,149	$ 1,229
Nonoperating deferred-tax (liabilities)	$ 559	$ 605	$ 788	$ 895
Deferred-tax assets (liabilities)	526	506	677	545

Table 3: Deferred income tax reorganization

In 2015, Monsanto reported an increase of $76 million in operating deferred taxes and thus operating cash taxes of $1.234 million.

	2013	**2014**	**2015**	**2016**
Operating taxes	$ 1,035	$ 1,221	$ 1,220	$ 1,158
Increase in operating deferred taxes	$ 27	$ 38	$ (113)	$ 76
Operating Cash Taxes	**$ 1,062**	**$ 1,259**	**$ 1,107**	**$ 1,234**

Table 4: Operating Cash Taxes

Free Cash Flow Calculation

Moving forward from NOPLAT, we need to add back the non-cash operating expenses and subtract the investments in invested capital. Adding back depreciation to NOPLAT, yields Monsanto's gross cash flow of $2,770 in 2016 (refer to Table 5). This is the cash flow generated solely by the company's operations. In other words, it is the cash that is available for investment without the need to raise any additional capital (Koller, Goedhart, & Wessels, 2011).

Investments in invested capital include the change in operating working capital, net capital expenditures, the change in capitalized operating leases, investments in goodwill and acquired intangibles as well as the change in net long-term operating assets. As each of these items requires special treatment, the following chapters are dedicated to analyze these in detail. In 2016, Monsanto reported a FCF of $2.441 million as can be seen in Table 5.

(Dollars in millions)	**2014**	**2015**	**2016**
NOPLAT	3,059	2,911	2,206
Depreciation	555	573	563
Gross Cash Flow	3,614	3,484	2,770
Change in operating working capital	650	(193)	(403)
Net capital expenditures	983	464	821
Decrease (increase) in capitalized operating leases	(7)	(249)	336
Investments in goodwill and acquired intangibles	928	(332)	(327)
Decrease (increase) in net long-term operating assets	290	(139)	(99)
Gross investment	2,844	(449)	329
Free cash flow	**770**	**3,933**	**2,441**

Table 5: Free Cash Flow Calculation

Operating Working Capital Calculation

Operating working capital refers to the investment in inventory, operating cash and other working capital components. To be consistent in the calculation, we need to exclude non-operating items such as excess cash[2], short-term debt, derivatives & hedging or dividends.

With $1.466 million in 2016, Monsanto holds a significant amount of excess cash which needs to be subtracted from the company's cash and cash equivalents reported on the balance sheet. Further operating items on the asset side of the balance sheet include accounts receivables, misc. receivables, inventory as well as other current assets.

On the liabilities side of the balance sheet, we have to include the accrued income taxes, the marketing and grower production programs, deferred revenue, compensation, as well as accounts and customer payables.

Subtracting the total current operating liabilities from the assets results into a working capital balance of $1.958 million in 2016.

[2] Based on the S&P 500 average, excess cash is defined as any cash balance held by the company that exceeds 2% of sales

(Dollars in millions)	**2013**	**2014**	**2015**	**2016**
Current Assets				
Cash and cash equivalents	3,922	2,407	3,748	1,736
- Excess Cash	*(3,625)*	*(2,090)*	*(3,448)*	*(1,466)*
Trade receivables, net	1,715	2,014	1,636	1,926
Derivatives and Hedging	24	99	77	33
Inventory, net	2,947	3,597	3,496	3,241
Other current assets	166	205	199	227
Total Current Assets	5,149	6,232	5,708	5,697
Current Liabilities				
Income Taxes Accrued/Payable	91	99	234	41
Accrued marketing programs	1,078	1,394	1,492	1,736
Deferred/Unearned Revenue (Short-Term)	517	438	370	568
Grower Production Accruals	60	54	39	45
Accrued Compensation & benefits	492	500	304	239
Customer Payable	12	82	72	104
Accounts Payable	995	1,111	836	1,006
Total Current Liabilities	3,245	3,678	3,347	3,739
Working Capital	**1,904**	**2,554**	**2,361**	**1,958**

Table 6: Operating working capital calculation

Net Capital Expenditures

Net capital expenditures (capex) can be calculated by subtracting last year's net PP&E asset value from this year's and adding back depreciation of the current year. For Monsanto this results into a net capex of $821 million in 2016 (Table 5).

Capitalized Operating Leases

Companies usually do not disclose the value of their operating leases but rather record the asset's rental expenses as well as future commitments of rental charges. For the valuation, the lease value should be included as an operating asset or otherwise companies that lease instead of buying assets appear to be "capital light". As the values are not disclosed, we can estimate the asset value by using the formula (Koller, Goedhart, & Wessels, 2011):

$$Asset\ Value_{t-1} = \left(\frac{Rental\ Expense_t}{k_d + \frac{1}{Asset\ Life}} \right)$$

The rental expenses are reported in the footnotes (Exhibit 4.6), while the cost of debt calculation will be explained in detail in the WACC calculation chapter. The asset life can be approximated by dividing total PP&E by the depreciation expense for the respective year. In 2017, Monsanto

has a rental expense of $249 million. In 2016, the company records an average asset life of 19.7 years and an after-tax cost of debt of 3%, resulting into an asset value of $3.031.

Operating leases			
(Dollars in millions)	**2014**	**2015**	**2016**
Rental Expense	272	273	256
Asset life	18.7	18.2	19.7
Cost of Debt	3%	3%	3%
Asset value	3,232	2,983	3,049

Table 7: Operating Leases

Investments in Goodwill and Acquired Intangibles

We can estimate the investment in goodwill and acquired intangibles by computing the change in net goodwill and acquired intangibles. In addition, cumulative amortization has to be added back for intangible assets that are amortized. For Monsanto, this leads to a total of $6.924 million in 2016 as shown in Table 8.

(Dollars in millions)	**2014**	**2015**	**2016**
Goodwill	4,319	4,061	4,020
Acquired Intangibles	1,554	1,332	1,125
Cumulative amortization and impairments	1,710	1,858	1,779
Adjustments to Goodwill and Acquired Intangibles	7,583	7,251	6,924

Table 8: Adjustments to Goodwill and Acquired Intangibles

Change in net long-term operating assets

Investments in other net operating assets have to be taken into consideration as well. For Monsanto, other long-term assets have to be netted against other liabilities. The delta yields -$99 million in 2016 (Table 5).

Forecasting

Revenues

Now that we have calculated Monsanto's FCFs, we need to forecast these values to determine the value of the company. Most importantly, we have to forecast Monsanto's revenues as most remaining income statement and balance sheet items will be a function of these. At this point, it is important to mention that forecasting is never a precise science. As for case study purposes, it is important that forecasts are undermined with a logical and reasonable explanation. The

following abstract in this teaching note will give an example.

As mentioned before, Monsanto consists of two main business: The Seeds and Genomics segments makes up around 74% of Monsanto's total business while Crop Protection makes up the remaining 26%. Each business has separate value drivers which will be highlighted and forecasted in this chapter. Overall, sales are driven by the three influencing factors *volume*, *price* and *currency impacts*.

The *currency impact* can be estimated by weighting the forecasted exchange rates with Monsanto's market share in the respective countries. Exhibit 5.3 shows the 3 major currencies that impact Monsanto's revenues. The revenue generated in the U.S. (59%), Brazil (11%), Argentina (6%) and in the Euro area (11%) already sum up to 88% of Monsanto's total turnover. As there is no currency impact from the U.S., only the latter three have to be taken into account. Furthermore, we can assume that the currency risk that Monsanto has in these countries comes from accounts receivables (farmers paying Monsanto for their products). Thus, a depreciation of the real, peso or euro has negative impacts for the company. Table 9 shows that by converting the values given in Exhibit 5.3 into percentages and by multiplying these with Monsanto's market share in 2016 (Exhibit 4.4), the projected FX impact can be calculated for the following years.

	2016	2017	2018	2019	2020	Market Share
BRL		2%	-3%	-3%	0%	11.0%
EUR		-2%	6%	2%	2%	12.0%
ARS		-14%	-7%	-9%	0%	6.0%
Overall FX Impact		**-0.8%**	**-0.1%**	**-0.6%**	**0.2%**	

Table 9: Projected FX Impact

Price/Volume Crop Protection: One of the main drivers of crop protection turnover is the farmer's income. If crop prices are high, farmers have more purchasing power in what regards branded crop protection chemicals. As crop prices have been depressed in the past 3 years due to strong harvests in the Americas, farmers increasingly moved to generic crop protection products which led ultimately to depressed sales for Monsanto. The forecast assumption that is

made here is that crop prices strongly correlate with herbicide sales. According to the U.S. Department of Agriculture, crop prices are estimated to be even lower in the next three years, while slowly starting to pick up again in 2019 (Exhibit 5.4).

As Monsanto lost its remaining glyphosate patents in 2000, there has been an immense increase in glyphosate production, leading to oversupply in the market and thus even further margin deterioration. As a result, the forecast assumption for the valuation is that revenue from herbicides will decrease -3% and -1% in 2017 and 2018 respectively, while remaining at 0% in 2019 and slowly picking up again in 2020 with 1% increase (Table 10).

		Incl. fx effect	*Excl. fx effect*	
Year	**Currency Effect**	**Herbicide Sales**	**Herbicide Sales**	**Herbicide Sales Δ**
2014	-2.2%	5,115	5,230	13%
2015	-4.9%	4,758	4,992	-5%
2016	-5.1%	3,514	3,692	-26%
2017	-0.8%	3,551	3,581	-3%
2018	-0.1%	3,542	3,545	-1%
2019	-0.6%	3,523	3,545	0%
2020	0.2%	3,588	3,580	1%

Table 10: Crop Protection Revenue Forecast

In contrast to the Crop Protection, Monsanto's Seed segment has slightly different value drivers. One main influencing factor is the expansion in acreage that is available for planting as a logical consequence of the more space available, the more seeds for plantation are required. At this point, one also has to take the market size of the main crops into consideration as well as weather forecasts and company own expansion plans:

Monsanto's Seed business can roughly be divided into corn, soy, cotton and other seeds. Monsanto's corn business makes up more than 50% of its total seed business and is by far the most advanced in terms of genetically modified variations as for example drought tolerance. Weather is always hard to forecast, but following the 2016 El Niño, the weather phenomenon La Niña is expected to show her impact by the end of 2016 and the beginning of 2017. La Niña lowers the average equatorial Pacific Ocean water temperature and is associated with an increase in droughts in the Americas as well as an increase in rain in Australia and Asia. As

Monsanto's biggest market is North and South America (~80% of sales), an increase in drought resistant corn seeds can be expected. However, there will be a slight headwind as a result of decreasing acreage in 2017 and 2018. After that we can only expect slow growth due to continuously depressed corn prices as well as a slow expected growth in acreage. Thus the corn forecast for the next five years is 5%, 1%, 3% and 2% until 2020 respectively as shown in Table 11.

		Incl. fx effect	*Excl fx effect*	
Year	**Currency Effect**	**Corn Sales**	**Corn Sales**	**Corn Sales Δ**
2014	-2%	6,401	6,542	-3%
2015	-6%	5,953	6,318	-3%
2016	-3%	5,825	6,000	-5%
2017	-1%	6,248	6,300	5%
2018	0%	6,357	6,363	1%
2019	-1%	6,512	6,553	3%
2020	0%	6,698	6,685	2%

Table 11: Seed Sales Corn Forecast

For soy seeds, Monsanto expects a 20% increase in sales in 2017 due to a newly introduced soy seed technology that already showed a favorable adoption rate in Latin America. However, from personal judgement as well as depressed farmers' spending, this number seems overestimated. Therefore, the assumption is that the 20% increase in sales will be reached only until 2018 with an approximate 10% sales increase each year. This is followed by 2% growth as well as 5% growth in 2019 and 2020 respectively due to an increase in available acreage.

		Incl. fx effect	*Excl fx effect*	
Year	**Currency Effect**	**Soy Sales**	**Soy Sales**	**Soy Sales Δ**
2014	-2%	2,102	2,148	27%
2015	-6%	2,276	2,416	12%
2016	-3%	2,162	2,227	-8%
2017	-1%	2,429	2,449	10%
2018	0%	2,692	2,694	10%
2019	-1%	2,731	2,748	2%
2020	0%	2,892	2,886	5%

Table 12: Forecast Seed Sales Soy

Monsanto's cotton sales show a high correlation of 71% between planted acreage and seed sales. Thus the best forecast for the cotton sales will be in accordance to the acreage forecast of 3%,

0%, 2% and 0% respectively until 2020.

		Incl. fx effect	*Excl fx effect*	
Year	**Currency Effect**	**Cotton Sales**	**Cotton Sales**	**Cotton Sales Δ**
2014	-2%	665	680	-4%
2015	-6%	523	555	-18%
2016	-3%	440	453	-18%
2017	-1%	463	467	3%
2018	0%	466	467	0%
2019	-1%	473	476	2%
2020	0%	477	476	0%

Table 13: Forecast Seed Sales Cotton

All the sales forecast figures are adjusted by the currency forecast of the most relevant currencies for Monsanto, namely the Brazilian real, euro and Argentine peso.

The remaining revenues from Monsanto's seed business are forecasted based on sales in 2016 which summed up to 2%. Thus, the forecast is assumed to be constant 2% for the next years. The total sales are a sum of the forecasted values from crop protection, corn, soy, cotton and others and can be seen in the last column 'Total Sales' in Table 14.

		Incl. fx effect	*Excl fx effect*		
Year	**Currency Effect**	**Other Sales**	**Other Sales**	**Other Sales Δ**	**Total Sales**
2013	-2%	1,396	1,425	-3%	14,861
2014	-2%	1,572	1,607	13%	15,855
2015	-6%	1,491	1,582	-2%	15,001
2016	-3%	1,561	1,608	2%	13,502
2017	-1%	1,626	1,640	2%	14,249
2018	0%	1,671	1,673	2%	14,660
2019	-1%	1,695	1,706	2%	14,865
2020	0%	1,744	1,740	2%	15,329

Table 14: Forecast Other Seed Sales & Total Sales

Forecasting the Income Statement

To forecast the income statement, we have to decide which economic relationship drives the line item. Most items are directly tied to the revenue, including COGS, SG&A and R&D. Some other items as for example depreciation or interest expenses are tied to a specific asset or liability on the balance sheet.

In a next step, we need to estimate the forecast ratios for each line item, based on historical ratios. For example, Monsanto's COGS to sales ratio was 44% in 2016. This level has been

more or less constant in the previous years. Next, we set the forecast figure for 2017 also to 44% and multiply this value by the forecasted sales figure. This leads to a COGS forecast of $6.249 million in 2017.

The typical forecast driver for depreciation is the prior-year net PP&E, interest expenses are driven by prior-year total debt, while interest income is driven by prior-year excess cash or in Monsanto's case by the customer financing program, as indicated by the footnotes. The fully forecasted income statement can be seen in Table 15.

Income Statement				**Forecast**			
(Dollars in millions, except per share amounts)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Net Sales	$ 15,001	$ 13,502	$ 14,249	$ 14,660	$ 14,865	$ 15,329
Cost of goods sold	6,819	6,485	$ 6,249	$ 6,429	$ 6,519	$ 6,723
Thereof depreciation expense	573	563	$ 593	$ 625	$ 643	$ 652
Gross Profit	$ 8,182	$ 7,017	$ 7,407	$ 7,605	$ 7,702	$ 7,953
Operating Expenses:						
Selling, general & administrative expenses	2,686	2,833	$ 2,565	$ 2,639	$ 2,676	$ 2,759
Research & development expenses	1,580	1,512	$ 1,567	$ 1,613	$ 1,635	$ 1,686
Restructuring charges	393	297	$ -	$ -	$ -	$ -
Total Operating Expenses	$ 4,659	$ 4,642	$ 4,132	$ 4,251	$ 4,311	$ 4,445
Income from Operations	3,523	2,375	$ 3,275	$ 3,354	$ 3,391	$ 3,508
Interest expense	433	436	436	$ 436	$ 436	$ 436
Interest income	(105)	(74)	$ (51)	$ (51)	$ (51)	$ (51)
Other expenses, net	34	22	$ 51	$ 51	$ 51	$ 51
Income from Continuing Operations Before Income Taxes	$ 3,161	$ 1,991	$ 2,839	$ 2,918	$ 2,955	$ 3,072
Income tax provision	864	695	$ 1,095	$ 1,120	$ 1,133	$ 1,168
Income from Continuing Operations	$ 2,297	$ 1,296	$ 1,744	$ 1,798	$ 1,822	$ 1,904
Discontinued operations:						
Income from operations of discontinued business	45	27	$ 27	$ 27	$ 27	$ 27
Income tax provision	17	10	$ 10	$ 10	$ 10	$ 10
Income on Discontinued Operations	28	17	$ 17	$ 17	$ 17	$ 17
Net Income	$ 2,325	$ 1,313	$ 1,761	$ 1,815	$ 1,839	$ 1,921
Less: Net income attributable to noncontrolling interest	11	(23)	$ -	$ -	$ -	$ -
Net Income Attributable to Monsanto Company	**$ 2,314**	**$ 1,336**	**$ 1,761**	**$ 1,815**	**$ 1,839**	**$ 1,921**

Table 15: Income Statement Forecast

Forecasting the Balance Sheet

To forecast the balance sheet, start by forecasting invested capital and non-operating assets. Excess cash and sources of financing are only forecasted in the end in order to make both sides of the balance sheet even. Again, we can forecast most line items as a function of revenues, starting with the operating working capital such as accounts receivables and accrued expenses. Two exceptions are inventories and accounts payable that can be forecasted as a function of COGS.

Forecast net PP&E as a function of revenues and depreciation as a percentage of gross or net

PP&E.

For goodwill and acquired intangibles we choose to keep these constant and set revenue growth from acquisitions to zero. This approach is preferred by practitioners as empirical literature suggests that typical acquisitions often fail to create value which makes forecasting goodwill and acquired intangibles unnecessary (Koller, Goedhart, & Wessels, 2011). Monsanto's forecasted balance sheet can be seen below in Table 16.

Balance Sheet			Forecast			
(Dollars in millions, except per share amounts)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Assets						
Current Assets						
Cash and cash equivalents	$ 3,701	$ 1,676	$ 1,221	$ 1,621	$ 2,020	$ 2,321
Operating cash	*300*	*270*	*285*	*293*	*297*	*307*
Excess cash	*3,401*	*1,406*	*$ 936*	*$ 1,328*	*$ 1,723*	*$ 2,014*
Short-term investments	47	60	60	60	60	60
Trade receivables, net	1,636	1,926	2,032	2,091	2,120	2,187
Miscellaneous receivables	803	755	797	820	831	857
Deferred tax assets	743	-	587	498	509	493
Inventory, net	3,496	3,241	3,123	3,213	3,258	3,360
Assets held for sale	-	272	-	-	-	-
Other current assets	199	227	240	246	250	258
Total Current Assets	10,625	8,157	8,060	8,550	9,049	9,535
Total property, plant and equipment	10,428	11,116	10,427	10,728	10,878	11,217
Less: Accumulated depreciation	5,455	5,885	4,907	5,048	5,119	5,279
Property, Pland and Equipment, Net	4,973	5,231	5,520	5,680	5,759	5,939
Goodwill	4,061	4,020	4,020	4,020	4,020	4,020
Other Intangible Assets, Net	1,332	1,125	1,125	1,125	1,125	1,125
Noncurrent Deferred Tax Assets	277	613	521	469	463	466
Long-Term Receivables, Net	42	101	107	110	111	115
Other Assets	610	489	516	531	538	555
Total Assets	$ 21,920	$ 19,736	$ 19,869	$ 20,484	$ 21,066	$ 21,754
Liabilities and Shareholder's Equity						
Current Liabilities						
Income Taxes Accrued/Payable	234	41	41	41	41	41
Accrued marketing programs	1,492	1,736	1,417	1,458	1,478	1,525
ST Borrowings and Current Portion of LT Debt	615	1,587	1,587	1,587	1,587	1,587
Dividends Accrued/Payable	254	237	312	322	326	341
Deferred/Unearned Revenue (Short-Term)	370	568	427	440	446	460
Grower Production Accruals	39	45	48	49	50	52
Accrued Compensation & benefits	304	239	252	259	263	271
Customer Payable	72	104	100	103	105	108
Restructuring Reserves	170	246	-	-	-	-
Miscellaneous short-term accruals	791	920	971	999	1,013	1,045
Accounts Payable	836	1,006	969	997	1,011	1,043
Total Current Liabilities	5,177	6,729	6,126	6,256	6,321	6,471
Long-Term Debt	8,429	7,453	7,453	7,453	7,453	7,453
Postretirement Liabilities	336	371	350	330	311	292
Long-Term Deferred Revenue	47	35	37	38	39	40
Noncurrent Deferred Tax Liabilities	340	68	68	68	68	68
Long-Term Portion of Env. & Litigation Liab.	194	200	193	193	193	193
Long-Term Restructuring Reserve	47	-	-	-	-	-
Other Liabilities	345	335	652	695	761	824
Shareowners' Equity:						
Outstanding	6	6	6	6	6	6
Treasury stock	(12,053)	(15,053)	(15,053)	(15,053)	(15,053)	(15,053)
Additional contributed capital	11,464	11,626	11,543	11,460	11,376	11,293
Retained earnings	10,374	10,763	11,291	11,836	12,388	12,964
Accumulated other comprehensive loss	(2,801)	(2,808)	(2,808)	(2,808)	(2,808)	(2,808)
Total Monsanto Shareowners's Equity	6,990	4,534	4,979	5,440	5,909	6,402
Noncontrolling Interest	15	11	11	11	11	11
Total Shareowners' Equity	7,005	4,545	4,990	5,451	5,920	6,413
Total Liabilities and Shareowners' Equity	$ 21,920	$ 19,736	$ 19,869	$ 20,484	$ 21,066	$ 21,754

Table 16: Forecasted Balance Sheet

WACC & Continuing Value

Now that we have forecasted the income statement, the balance sheet and thus the FCFs, we can move over to determine the discounting factor for Monsanto's FCFs. For this purpose, we estimate the company's weighted average cost of capital (WACC) based on Monsanto's capital structure as well as cost of debt and equity.

Cost of Equity

The cost of equity can be estimated by using the capital asset pricing model (CAPM), which equates the risk-free rate, the company beta and the expected return of the market.

Risk-free rate: The risk-free is ideally estimated by using a risk-free government bond with the same maturity as the DCF. For this purpose, we can use US Treasury yields with 1, 2, 3, 5, 10 and 30 years' maturity (Exhibit 5.1).

Beta: Monsanto's equity beta can be estimated by regressing the monthly stock returns of the past five years with the returns of MSCI World for the same time frame (data retrieved from Bloomberg Terminal). The regression is based on monthly returns in order to avoid systematic biases. This leads to a beta of 0.92 (Table 18). This beta however is quite imprecise as we can see that R^2 only delivers a value of 25%. In order to improve the beta estimation, we use industry betas as we can assume that these companies face similar operating risks. The industry companies for comparison (Table 18) as well as respective share price data and foreign exchange rates can be retrieved from Bloomberg Terminal. To find the industry's raw regression beta, we need to un-lever the individual betas in order to adjust for the company's leverage and thus different financial risk[3]. According to the theory of Modigliani and Miller (1963), this can be done by multiplying the equity beta with the company's debt to equity ratio using the following formula:

[3] Please note that industry companies may be denominated in different currencies. In order to avoid distortions caused by currency fluctuations, it is recommended to subtract currency returns for the calculation of the raw regression betas (refer to tab "Industry Betas")

$$\beta_e = \beta_u \left(1 + \frac{D}{E}\right)$$

The total debt can be estimated by subtracting excess cash from the company's total debt plus operating leases. The market value of equity is given by the current market capitalization using the share price multiplied by the share price outstanding (Table 17).

	Monsanto *USD*	Dupont *USD*	Syngenta *CHF*	Dow *USD*	Bayer *EUR*	BASF *EUR*
Short-term debt	1,587.00	1,165.00	553.07	995.00	3,099.94	4,473.66
Long-term debt	7,453.00	7,642.00	3,218.33	16,215.00	17,949.54	12,214.17
Operating leases	3,200.00	3,773.75	903.82	7,516.67	5,019.87	9,206.92
Less: Excess cash	1,405.96	4,797.40	882.47	7,601.44	1,024.00	913.64
Total net debt	10,834.04	7,783.35	3,792.76	17,125.23	25,045.34	24,981.10
Share price ($)	102.42	70.32	394.13	54.07	97.01	88.08
Shares outstanding	438.18	869.34	92.58	1,121.38	826.95	918.48
Market value of equity	44,878.01	61,132.13	36,487.53	60,633.07	80,219.03	80,895.29
Debt-to-equity ratio	0.24	0.13	0.10	0.28	0.31	0.31

Table 17: Debt-to-equity Calculation

Now that the unlevered beta solely reflects the operating risk, we can average all betas across the industry, which results in an average unlevered beta of 0.59 for the seed and crop protection industry.

To re-lever Monsanto's beta we need to multiply the industry average unlevered beta by 1 plus Monsanto's D/E ratio, which results in a beta of 0.74.

Company	**Equity Beta**	**D/E**	**Unlevered Beta**
Dupont	1.51	0.13	1.34
Syngenta	0.82	0.10	0.75
Vilmorin & CIE	0.59	0.72	0.34
Dow	1.19	0.28	0.93
Bayer	0.94	0.31	0.72
BASF	1.12	0.31	0.86
Nufarm	0.67	0.33	0.50
KWS	0.21	0.14	0.18
Yuan Longping High tech Agricu	0.04	0.04	0.04
Sakata Seed Corp	0.53	-0.08	0.58
Coromandel International Limited	0.75	0.35	0.56
Agrium Inc	0.49	0.45	0.34
Monsanto	0.92	0.24	0.74
Average Unlevered Beta			**0.59**
Relevered Monsanto Beta			**0.74**

Table 18: Beta calculation

Expected Market Return: For the market risk premium (expected market return minus risk free rate), we can rely on historical estimates that range from 4.5 to 5.5% (Koller, Goedhart, & Wessels, 2011). For this valuation purpose, it was decided to apply an expected return of the market of 6.5%.

After-Tax Cost of Debt

We can estimate the cost of debt by looking at the yield of the company's long-term bonds. Monsanto is rated A3 and BBB by Moody's and S&P respectively and thus still accounts as investment grade. The company's MON 3.95 04/15/45 bond yields approximately 4.75% (Exhibit 4.6), which is in accordance with the average yield spreads of corporate bonds over U.S. treasuries. According to Moody's A-rating, a 30-year corporate bond should yield 4.2% while a BBB-rated bond yields 4.8% on average.

Next, we need to incorporate the tax shield. This can be done by multiplying the cost of debt with 1 minus the statutory tax rate (Koller, Goedhart, & Wessels, 2011), yielding an after-tax cost of debt of 3% (Table 20).

WACC

In a next step we need to calculate the proportion of total capital. Total debt and the market value of equity have already been calculated in a previous step in order to determine the D/E ratio. Monsanto has a debt proportion of 19% ($10.834 million), while equity makes up the remaining 81% ($44.878 million). The company's after-tax cost of debt sums up to 3%, while the cost of equity for the first year yields 4.7%, 4.8% for the second and so on (Table 19).

Maturity	**1**	**2**	**3**	**4**	**5**	**10**	**30**
Risk-free rate	0.78%	1.1%	1.4%	1.3%	1.8%	2.3%	3.0%
Beta	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Exp. Return of the market	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Expected return of security	**5.04%**	**5.12%**	**5.19%**	**5.16%**	**5.30%**	**5.43%**	**5.60%**

Table 19: Monsanto Cost of Equity

Going from there, the company's WACC sums up to 4.4% for year one and two.

Source of capital	Proportion of total capital	Proportion of total capital (%)	Cost of capital	Statutory tax rate	After-tax opportunity cost	Contributed to weighted average						
Years						**1**	**2**	**3**	**4**	**5**	**10**	**30**
Debt	10,834.04	19%	4.75%	35.0%	3.09%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Equity	44,878.01	81%	4.66%		4.66%	3.8%	3.8%	3.9%	3.9%	4.0%	4.1%	4.2%
WACC	55,712.05	100%				**4.4%**	**4.4%**	**4.5%**	**4.5%**	**4.6%**	**4.7%**	**4.8%**

Table 20: WACC Calculation

Continuing Value

Continuing value can be estimated by using the following formula (Koller, Goedhart, & Wessels, 2011):

$$Continuing\ Value_t = \frac{NOPLAT_{t+1}\left(1 - \frac{g}{RONIC}\right)}{WACC - g}$$

Where RONIC represents the expected rate of return on new invested capital but can, for simplicity reasons be set equal to the industry median ROIC of 5,5% (Koller, Goedhart, & Wessels, 2011). The growth rate can be estimated by summing the expected inflation rate (2.8%) and the expected long-term rate of consumption growth for seeds and crop protection chemicals (0.43%). This growth rate has been estimated based on the future average consumption growth in various crops weighted by their market share. The expected inflation per country has been weighted by Monsanto's current market share.

Country	Market Share	Exp. Inflation
North America	59.31%	2%
South America	21.15%	5.70%
Europe	11.38%	1.50%
Canada	5%	2%
Asia	3.58%	2.20%
Sumproduct	**100%**	**2.8%**

Source: Bloomberg

Crop	Avg. per Capita consumption	Weight	Avg. consumption growth
Rice	142.5	17%	0.06%
Wheat	213.7	25%	0.14%
Soy	97.9	12%	1.14%
Cotton	7.2	1%	0.07%
Coarse	385.9	46%	0.55%
Total	**847.20**	**100%**	**0.43%**

Table 21: Long-term growth rate calculation

Overall this leads to a continuing value of $64.716bn.

NOPLAT	2,951
RONIC	5.5%
WACC	5.1%
Growth Rate	**3.2%**
Continuing value	**64,716.21**

Table 22: Continuing Value Calculation

Discounting Cash Flows

After calculating the cash flows for the explicit forecast period until 2020 and estimating Monsanto's continuing value, we can now discount and sum these cash flows based on the WACC of the respective discounting period. This leads to a company value of $61.703 million.

Year	Cash Flow	Discounted Value
2016	2,440.77	2,332.17
2017	2,372.50	2,163.19
2018	2,664.56	2,316.25
2019	2,784.92	2,312.81
2020	2,711.77	2,138.12
2021+	64,716.21	50,440.19
Company Value (DCF)		**61,702.74**
EV (Mkt Cap+Debt-Cash)		52,894.89
Bayer Proposal ($128 per share)		65,234.68
DCF incl. Synergies		63,202.74

Table 23: Monsanto Company Value

Adding Bayer's proposed synergies of $1.5, Monsanto can be valued at $63.2, which is above the current market value of the company of $53bn, however below the offer that Bayer has made. A reason for this might be that Bayer expects more growth in the seed business of Monsanto.

Q2. Financing

Risks of financing the deal and evaluation of Bayer proposal

Risks: The major risk in financing the transaction is the size of the deal. Bayer needs to issue a substantial amount of equity in order to avoid a skyrocketing debt/EBITDA multiple and further downgrading by the credit rating agencies. This equity share is needed in order to receive the

bridge loan from the banks, as banks would otherwise fear that a refinancing of the bridge could run into severe problems. On the other hand, an equity increase of $19bn (~€18bn) would significantly dilute the current shareholder's stake. And even though Bayer avoided the shareholder's approval by not issuing more than $19bn, shareholders could still be dissatisfied. In case of a market crash, a slide of the Bayer share or a substantial appreciation of the USD versus the EUR, the company would have to issue even more new shares in order to raise the required amount of $19bn. This would consequently further dilute ownership and decrease the share price even more, thus contributing to the dissatisfaction of the shareholders.

The debt issuance can be seen less risky and easier to manage due to the current low-interest-rate environment as well as Bayer's high creditworthiness. However, high debt also implies that future cash flows have to be used in order to repay debt rather than utilizing the money for further investments and thus growth. And, in addition, this transaction would be one of the largest debt issuances in the history of M&As.

Evaluation: The bridge financing enables Bayer to close the gap between the need for cash and the liquidity event in which they will be able to issue the necessary debt and equity. Usually this should happen within the first 12 month and comes with certain warranties as e.g. a maximum debt-to-equity ratio.

The equity financing is divided into two components: a rights issue as well as mandatory convertible bonds. A rights issue is generally more positively seen in the market than an accelerated book building (cash offer) where new shares are sold to investors at large which is additionally limited to 10% of share capital by German regulation (§ 208 AktG). Right offers protects existing shareholders from underpricing (DeMarzo & Berk, 2014).

The mandatory convertible bonds will ultimately be converted into equity by dividing the aggregate investment amount by a conversion price in order to determine the number of shares. The use of this tool contributes to a flexibility for Bayer in the financing as it can be adapted to certain capital structure requirements at a given time and allows Bayer to tap an additional

investor pool (besides classic debt/equity). Another advantage is that if the conversion takes place within 3 years, the convertibles are seen as equity by rating agencies, while the company can still enjoy the tax shield of the interest rate payment.

How to successfully issue the planned amount of equity? What is the max discount for the new shares to avoid a shareholder vote?

As can be seen in the Bayer report annex (Exhibit 6), the company is allowed to increase its common stock by €530 million without prior consent of the shareholders. This amount divided by the company's current capital stock (€2.117bn) yields 25%. Thus Bayer can increase its equity by 25% without any further hurdles. The nominal value of one share equals €2.56 (€2.117bn / 826,947,808 shares outstanding). Dividing the capital stock raise (€2,117bn + €530 million) by the nominal value of one share (€2.56) yields 207,029,919, which is the amount of new shares that Bayer can issue. The price for these shares can be assessed by dividing the equity fund needed ($19bn) by the amount of newly issued shares. This yields a price of $91.77, which equates a 12.6% discount to Bayer's current share price of €100 and a EUR/USD exchange rate of 1.05.

At this point it becomes obvious that Bayer could run into serious problems to issue the needed amount of equity. The success of the issuance depends on the share price that Bayer can offer the new shares ($91.77) and the respective exchange rate. If the Euro amount of $91.77 exceeds the current share price (currently €100, but with a lot of fluctuation since the acquisition announcement), investors won't buy. This scenario could happen either if Bayer's share value drops below $91.77 due to market fluctuations or if the exchange rate is unfavorable due to USD appreciation/EUR depreciation or most likely due to a combination of both. Bayer pledged to pay $19bn, but this money has to be raised in Euros as Bayer shares are denominated in this currency. In either case, Bayer could run the risk to not be able to issue the desired amount of equity unless with their shareholder's approval.

Bayer has to offer shares at a fair discount in order to be successful. The new shares have to be

issued at a discount to the market price, otherwise no one would buy. If the discount is big enough, all shares will be sold for sure. Generally, a discount close to the market price is desirable, as it is fairer to all investors irrespective of a subscription. However, if the price of the newly issued shares is too high, Bayer has to pay underwriting fees to the banks to make sure that all shares are sold. The smaller the discount to the market price, the more expensive the underwriting will be for the reason that banks will face a higher risk and thus need to be compensated. If Bayer wants to avoid shareholder consent, the maximum discount they can offer, given a constant exchange rate of 1.05 and a market value of €100 per Bayer share, equals 12.6%.

How will the share price be affected?

This can be calculated by computing the theoretical ex-rights price which represents the deemed share value immediately after a rights issue. First, the price of the newly issued shares has to be assessed given an appropriate discount (e.g. 12.6% of €100 as of 01/03/17 equals €87). The number of new shares to issue can be calculated by the amount of equity needed (€18bn) divided by the new share price (yields 207,029,967 shares to be issued). The number of rights needed by an investor to purchase a new share can be obtained by dividing the current shares outstanding by the number of new shares that have to be issued (826,948,000/207,029,967 = 4). Next, the new market cap needs to be calculated by adding the equity raise to the former market cap (yields ~€100.8bn). Dividing the new market cap by the total amount of shares outstanding results in a new share price of €97.48 per Bayer share right after the new issue. The value of a right is thus €0.63 ((€100-€97.48)/4).

Q3. Strategy

Was the decision to acquire Monsanto right? Would there be alternatives?

With respect to Bayer's product portfolio, the acquisition makes a lot of sense. Bayer does not follow the same conglomerate approach as BASF. BASF can more easily deal with the diminishment in market relevance as only 9% of their overall sales come from agrochemicals,

while it is around 30% for Bayer. If BASF were to acquire Monsanto and all the other mergers would be accomplished, Bayer would most likely suffer from margin losses and decrease in profitability due to comparative disadvantage.

Furthermore, Bayer will be able to generate more synergies than the competitor especially in the R&D area for genetically modified products. Due to its pharmaceutical orientation, Bayer has more know-how and capacities when it comes to research in this area. Moreover, unlike BASF, Bayer has already been engaged in the seed business. Even though BASF has collaborated with Monsanto previously, they have not yet risked the step to fully enter into the seed business, possibly due to image reasons.

An alternative to Monsanto could be other smaller agrochemical companies such as NuFarm or KWS. However, as these companies are substantially smaller than Monsanto, this could put Bayer at risk that BASF acquires Monsanto.

How will the competition most likely react?

If all the deals will go through the antitrust regulations, there are most likely attractive divestments and thus investment opportunities for competition such as BASF. As mentioned above, Bayer will almost for sure have to divest the Stoneville Pedigreed Seed Company or the Delta & Pine Land Company. This is only one of many possible expansion opportunities for BASF. And since the merging companies are under pressure to sell, the price should also be quite attractive.

Are there other factors that have not yet been considered?

Other factors that could be considered in this deal are for example the risk management of foreign exchange fluctuations regarding the buying price of the target company. Bayer announced to pay $57bn for Monsanto's equity. However, Bayer's main operating currency is Euro. This means, with the USD appreciating, the buying price will be much more expensive in terms of EUR. Here, one could think of possible tools (i.e. derivatives) to hedge the foreign exchange risk.

Another factor is the cultural difference in leadership styles between Germans and Americans that is often neglected, however can play a major role for a successful acquisition. The cross-border merger between Daimler and Chrysler in 1995 ended in a fiasco as cultural differences and organizational culture have both played their part.

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